

7. Answer any one part of the following :
- (a) Discuss construction and principle of operation of moving iron type measuring instruments. Also enlist advantages and disadvantages of it.
- (b) Discuss the principle of operation of a single-phase induction motor. How the motor is started ? Explain any one method of starting of it.

Printed Pages : 8

EEE-201

(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 2302

Roll No.

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**B. Tech.**

**(Second Semester) Theory Examination, 2010-11**

**ELECTRICAL ENGINEERING**

*Time : 3 Hours]*

*[Total Marks : 100*

*Note : Attempt questions in all Sections. Assume any missing data if any.*

**Section-A**

1. Attempt *all* parts of this questions. Answer (xvi) to (xx) by True or False. 1×20=20
- (i) Any closed path formed by branches in a network is .....
- (ii) Three resistances of 3 ohm each are connected in delta. The value of equivalent star is .....
- (iii) Time constant of RL circuit is .....
- (iv) The highest speed of 50 Hz ac generator can be .....

- (v) In delta-connected generator, the sum of instantaneous voltages around the delta is equal to .....
- (vi) The power factor in a RLC series circuit will be lagging if .....
- (vii) Common condition to both series and parallel resonance is .....
- (viii) If  $W_1$ ,  $W_2$  and  $W_3$  are the readings of three Wattmeters used to measure the power in 3-phase 4-wire circuit, the total power of load circuit will be .....
- (ix) The current drawn by a 120 V dc motor of armature resistance  $0.4 \Omega$  and back emf 112 V is .....
- (x) The rotor speed of a six pole 50 Hz induction motor is 960 rpm, the percentage slip is .....
- (xi) What will happen if the back emf of DC motor vanishes?

- (xii) ..... motor has self-load properties.
- (xiii) ..... motor will be preferred for elevators.
- (xiv) Type of coiling fan motor is .....
- (xv) A moving coil ammeter has a full scale deflection of  $50\mu A$  and a coil resistance of  $100\Omega$ . The value of shunt resistance required for the instrument to be converted to read a full-scale reading of 1 A will be .....
- (xvi) After very long time, a capacitor behaves as short circuit. (True/False)
- (xvii) Principle of homogeneity shows linear circuit. (True/False)
- (xviii) Transient analysis can be performed in purely resistive circuit. (True/False)
- (xix) Shunt capacitors are employed for power factor improvement. (True/False)
- (xx) A highly selective circuit has high Q-factor. (True/False)

### Section-B

2. Attempt any *three* parts of the following :  $10 \times 3 = 30$

(a) State superposition theorem in dc network.

Determine the current  $i_1$  and  $i_2$  in the following network shown in Fig. 1.

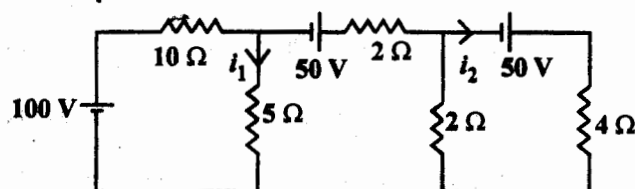


Fig. 1

(b) What are the necessity and advantages of 3-phase system ? Derive  $I_L = \sqrt{3} I_{ph}$  for delta connected system.

(c) Explain the main components of power supply system. Also discuss the concept of grid in power system.

(d) Derive the quality factor  $Q$  of the series RLC circuit at resonance. Define the bandwidth for the same.

(4)

(e) A three phase 50Hz Induction motor has a full-load speed of 1440 rpm. Calculate :

(i) Slip

(ii) Number of poles.

(iii) Frequency of rotor induced emf

(iv) Speed of rotor field with respect to rotor structure.

(v) Speed of rotor field with respect to stator field.

### Section-C

Attempt *all* questions in this Section.  $10 \times 5 = 50$

3. Answer any two parts of the following :

(a) Draw V-I characteristic of voltage and current sources. Explain source transformation theory in any circuit.

(b) Convert the network at terminals  $ab$  by its Norton's equivalent circuit. Hence determine  $I$  of the circuit shown in Fig. 2.

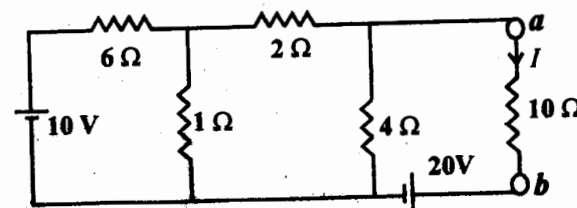


Fig. 2

(c) State and prove maximum power transfer theorem.

(5)

4. Answer any one part of the following :

(a) Three voltages represented by the following equations are :

$$e_1 = 15 \sin \omega t, e_2 = 5 \sin(\omega t + \pi/4) \text{ and } e_3 = 10 \cos \omega t$$

together in an ac circuit. Represent these voltages by phasor and calculate an expression for the resultant voltage. Also cross, verify it.

(b) A 46 mH inductive coil has a resistance of  $10\Omega$ .

How much current will it draw, if connected across 100V, 50 Hz source ? Also determine the value of capacitance that must be connected across the coil to make the power factor of the circuit to be unity.

5. Answer any one part of the following :

(a) Explain the two-Wattmeter method for determination of power and power factor of three-phase load with suitable diagram.

(b) A balanced delta connected load of  $(12+j9)\Omega/\text{phase}$  is connected to 3-phase 400 V supply.

Find :

- (i) Line current
- (ii) Power factor
- (iii) Power drawn
- (iv) Reactive Volt-Amperes
- (v) Total Volt-Amperes.

6. Answer any two parts of the following :

- (a) Explain construction and principle of operation of synchronous alternator.
- (b) Sketch and explain speed-torque characteristics of following dc motor :
  - (i) Shunt motor
  - (ii) Compounded motor.
- (c) Derive an emf/voltage expression of power transformer. Also draw an equivalent circuit of it.